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## (54) A STORAGE BATTERY SEAL

(71) We, NORDISKA ACKUMULATOR-FABRIKER NOACK AB, a Swedish Company, of Kommendörsgatan 16, S-102 46 Stockholm, Sweden, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

The present invention relates to a storage battery, preferably traction batteries, comprising a cover having an opening therein through which a terminal post connected to a post strap common to a plurality of such posts protrudes, and a lead-through arranged in said opening.

Such storage batteries are known to the art. With these known batteries the terminal post, and hence the cell plate, is rigidly connected to the battery cover. During the operation of the battery, the positive electrode plate of the battery is liable to expand vertically, causing the terminal post to lift with subsequent damage to the battery cover etc., and the escape of electrolyte from the battery cells.

Accordingly it is a prime object of the invention to provide a lead-through which can move axially with the terminal post whilst maintaining a seal between the interior of the battery and the surroundings and to prevent damage to the battery as a result of expansion of the electrode plate.

Thus, this invention consists in a storage battery comprising a cover having a circular opening arranged therein through which a terminal post connected to a post strap common to a plurality of such terminals protrudes and a lead-through arranged in said opening, wherein said lead-through comprises a cylindrical sleeve sealingly mounted in said opening concentrically with said terminal post, the internal diameter of said sleeve being greater than the diameter of the post, and wherein sealingly arranged between the inner wall of said sleeve and the outer wall of said post is an insert means for permitting movement of the post along the longitudinal axis thereof relative to said sleeve whilst maintaining a seal between the interior of the battery and the end of the post external to said battery.

So that the invention will be more readily understood and further features thereof made apparent, exemplary embodiments of the invention will now be described with reference to the accompanying schematic drawings, in which:—

Figure 1 is a sectional front view of a first embodiment of the invention;

Figure 2 is a top plan view of Figure 1;

Figure 3 is a sectional side view of a second embodiment of the invention; and

Figure 4 is a top plan view of Figure 3.

In the drawings like elements are identified by like reference numerals.

Referring first to Figures 1 and 2, there is shown a lead-through for a terminal post of a lead acid battery. The lead-through comprises a cylindrical sleeve 1 which is intended to be inserted in a round hole in the cover of a lead-acid storage battery, not shown, said sleeve having an upper flange 2 for abutment with the upper surface of the battery cover, and a lower radially inwardly extending flange 3 having knife-edge surfaces thereon, said knife-edge surfaces serving as drainage means for migrating electrolyte in a manner hereinafter explained. Arranged radially within the sleeve 1 is a sealing insert shown generally at 4. This insert comprises an inner lead bushing 5 having arranged on the outer surfaces thereof a plastics member 6. The plastics member 6 is suitably applied to the bushing 5 as by injection moulding, the bushing 5 being provided with ridged surfaces 7 to obtain more favourable contact between the lead bushing and the plastics material.

The outer surface of the plastics member 6 has provided therein a circumferentially extending channel 8 which together with an opposing wall of the cylindrical sleeve 1, in the assembled state of the lead-through, forms a housing for a sealing ring, such as the O-ring 9. Conveniently the width of the channel 8 is such as to permit a limited degree of movement of the O-ring 9 therein. As will be readily perceived, the channel 8 may be formed in the inner surface of the sleeve 1 instead of the plastics member 6, the depth of the channel, however, should, in either case, be such that intimate contact

is obtained between the whole of the inner surface of the sleeve 1 and the outer surface of the plastics member 6. In operation of the storage battery, radial forces are taken up by the inner wall of the sleeve 1, via the sealing insert 4.

The plastics member 6 has provided at the top thereof a circumferentially extending collar 10 intended to receive and secure the flanged edge of a sealing cap 11. This cap forms no part of the present invention and will not therefore be described in detail.

The terminal post for which the illustrated lead-through is intended is shown at 12 and comprises a lead-coated copper conductor 13 surrounded by a lead jacket 14. The conductor 13 is shown to be provided with a copper insert 16 for reducing the internal resistance of the terminal post.

The terminal post 12 is assumed to be connected to a post strap common to a plurality of electrode plates. As will be seen from the drawing, the diameter of the sleeve 1 is much larger than the diameter of the terminal post 12, which facilitates ease of assembly of the lead-through onto the protruding end of the terminal post.

When assembling the lead-through to the cover of a storage battery, the sleeve 1 is inserted in the opening therefor, through which the terminal post projects. The sealing insert is then fitted, with the sealing ring 9 in place, over said protruding end of the terminal post so as to be in sliding contact with the inner surface of the sleeve 1, as illustrated in the drawing. The lead bushing 5 is then welded at the top thereof to the lead jacket 14 of the terminal post 13, as shown at 15 so as to sealingly connect the terminal post 13 to the sealing insert 4.

As will be understood from the foregoing, the sealing insert 14, and thus also the terminal post 13, is able to move axially relative to the cylindrical sleeve 1 without placing undue strain on the battery cover. Thus, should the terminal post expand axially during operation of the battery, the battery will suffer no deleterious effects therefrom, owing to the slidability of the insert 4 attached to the terminal post by weld 15.

An electrolyte migrating along the terminal post will collect at the knife-edge or edges 3 and fall back into the battery cell. The weld 15, however, serves as an additional seal, should any electrolyte 4 escape the knife-edge surfaces 3 and continue to migrate up the terminal post 13.

In the embodiment of Figure 3 the knife-like drainage surface or surfaces has or have been replaced with a bellow-like sealing structure 20. The sealing insert 4 again comprises an inner lead bushing 5 and an outer plastics member 6 applied thereto. In this case, however, the plastics member 6 has a lower part 17 of generally annular configura-

tion with one limb 18 of the annulus extending behind the lead bushing 5 in contact with the lead jacket 14 of the terminal post 13. The bellow-like sealing structure 20 is an extension of this limb 18.

One end of the structure 20 has a thickened portion 19 which is secured, as by welding, to the lower end of the sleeve 1 as shown, thereby providing an efficient seal against the migration of electrolyte. Here again, the sealing ring 9 and the weld 15 form auxiliary seals safeguarding against the escape of electrolyte from the battery cell.

As will be readily seen from Figure 3, the bellow-like structure 20 will extend should the terminal post 14 expand axially, to permit axial sliding movement of the sealing insert 4 against the inner surface of the sleeve 1.

In other respects, the embodiment of Figure 3 is identical to that of Figure 1.

Although the invention has been described and illustrated with reference to two embodiments thereof, these embodiments are not restrictive of the invention, since the invention can be modified within the scope of the following claims.

#### WHAT WE CLAIM IS:—

1. A storage battery comprising a cover having a circular opening arranged therein through which a terminal post connected to a post strap common to a plurality of such terminals protrudes and a lead-through arranged in said opening, wherein said lead-through comprises a cylindrical sleeve sealingly mounted in said opening concentrically with said terminal post, the internal diameter of said sleeve being greater than the diameter of the post, and wherein sealingly arranged between the inner wall of said sleeve and the outer wall of said post is an insert means for permitting movement of the post along the longitudinal axis thereof relative to said sleeve whilst maintaining a seal between the interior of the battery and the end of said post external to the battery.

2. A storage battery according to Claim 1, wherein said insert means comprises an inner bushing of lead and an outer member of plastics material applied thereto, wherein the outer surface of the outer plastics member or the inner wall of said sleeve has a channel extending circumferentially therearound for receiving a sealing ring, and wherein the lead bushing is secured to the terminal post as by welding.

3. A storage battery according to Claim 1 or 2, wherein the insert means has drainage means arranged on the end thereof remote from the protruding end of said terminal post.

4. A storage battery according to Claim 1 or 2, wherein the outer plastics member of said insert means has arranged at its lower

- end a bellow-like structure one end of which is welded to the bottom of the cylindrical sleeve and the other end of which is integral with said plastics member, said bellow-like structure being arranged to extend upon said relative movement of said post to said sleeve, to maintain a seal between the interior of the battery and the protruding end of said post.
- 10 5. A battery according to any one of the preceding claims, wherein said terminal post comprises an inner case of copper and an outer lead jacket.
6. A battery according to Claim 5, wherein the lead bushing is welded to the outer lead jacket of the terminal post.
7. A storage battery substantially as hereinbefore described with reference to and as illustrated in Figures 1 and 2, or Figures 3 and 4, of the drawings.

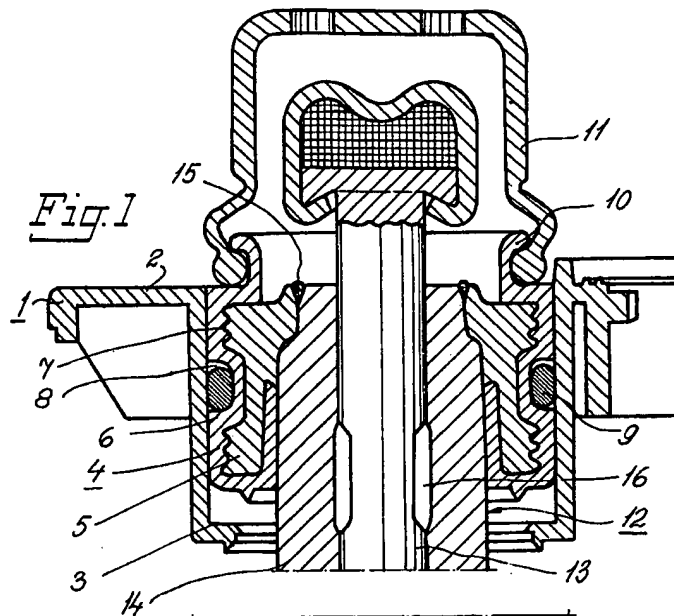
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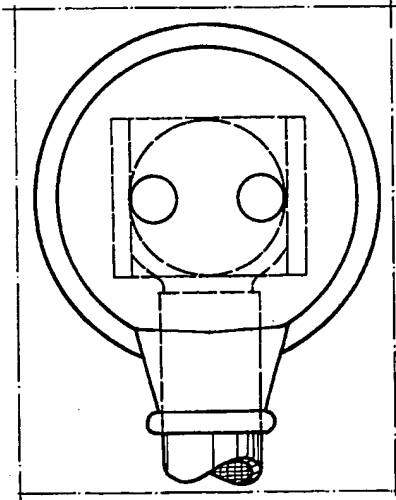
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*Fig. 2*

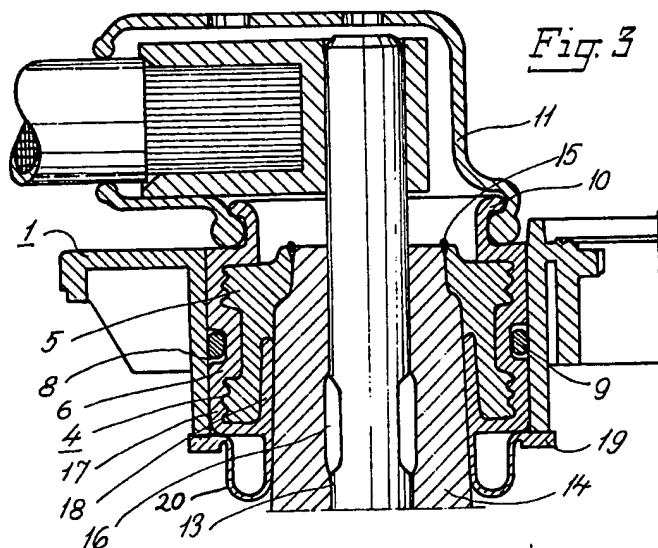


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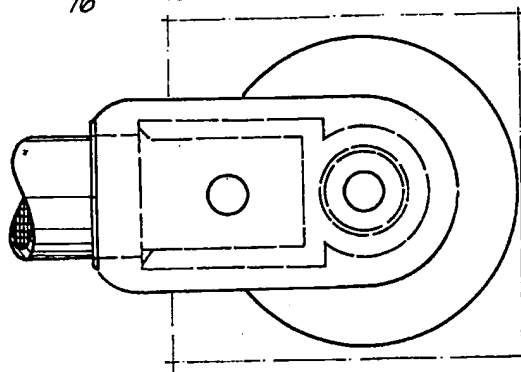
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Sheet 2



*Fig. 3*



*Fig. 4*